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Occupational Outlook Quarterly

IN THIS ISSUE:

- Geographic Mobility and the Young Worker
- Employment Opportunities for Factory Operatives
- Careers for Women in the Biological Sciences

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in cooperation with
VETERANS ADMINISTRATION

Occupational Outlook Quarterly

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Bureau of Labor Statistics
Ewan Clague, Commissioner

This publication is issued to provide counselors with current information on employment trends and outlook, based primarily on the continuous research and statistical programs of the Bureau of Labor Statistics. It supplements and brings up to date information in the Occupational Outlook Handbook. It is prepared with the advice and assistance of the --

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GEOGRAPHIC MOBILITY OF YOUNG WORKERS

by Margaret L. Plunkett

Americans have always been on the move, impatient with a limited environment, ambitious to find better opportunities. Moving is an integral part of the national psychology. This willingness to "pack up and go" has been stimulated by various incentives during our national history--first, the conquest of the great Middle West and the opening up of new farm lands; later, the rush to the Far West and to the Yukon for gold; and much later, the mass migrations of industrial workers to defense jobs during the two world wars. Since then, American experts and technicians have moved to the far corners of the world, to Asia, to Africa, to the Middle East, taking along with them American agricultural and industrial know-how.

The mobility of a people has several dimensions--industrial, occupational, and geographical. The reasons for moving may be economic advantage, pleasure, health, or desire for adventure. The streams of migration are sometimes predominantly in one direction, but often cross each other going in opposite directions. Some of the people who move are purposeful, knowing exactly why and where they are going; others are drifting, without clear objectives, but hoping for something better than they have where they are. The young are more likely to move than the middle-aged and older.

Over the past 10 years, about the same proportion of the Nation's population (aged 1 year and over) changed their residence each year (between 19 and 20 percent), even though the overall population increased substantially. By the spring of 1959, the Nation's population had grown to about 171 million (from 147 million in March 1950), and the number of people moving annually had increased to 33 million (from 28 million in 1950). Most of these people, however, simply made house-to-house moves within the same county. Over the past decade, from 5 to 5.5 million each year moved from one county to another within the same State. Another 5 to 5.5 million people each year, or over 3 percent of the population, moved from one State to another.

What are the general directions these movers are taking? Apparently, Americans are still going west. Between 1953 and 1958, the primary shift--measured in terms of net migration--was to the West. The next strongest movement was from the South, with only small net outward shifts for the Northeast and North-Central regions. All regions, of course, experienced in-and-out migration. The South in this 5-year period lost over a million people by outmigration. More than 875,000, however, moved in, but the South was left with a net loss of 150,000 people. The West, showing net gain, lost 500,000 but received more than 700,000 people.

Who Moves?

Among the interstate movers, the 20-to-24-year-olds are the most mobile. In 1958, for example, 9 percent changed States. About the same proportion of young men and women moved. The next most mobile group was the 25-to-29-year-olds--about 7 percent made interstate moves in 1958. Between age 30 and 34, the proportion of interstate movers dropped off markedly (3.5 percent in 1958). This is the age when families have become established and the physical difficulties of moving, as well as the financial costs and risks, become greater. Home ownership, school attachments of their children, and a generally greater job security attained in the prime working years tend to anchor those in the middle-age groups to their settled places. People 45 and over appear to be the most

settled; their mobility rate in 1958 was less than 1.5 percent.

The tendency to move is about the same, on the whole, for women as for men, but there are significant differences among the age groups. For example, in the 14-19 age group relatively higher proportions of women change their residence from one State to another. After that, they appear to be more settled than men until they reach age 65. The reasons for these shifts seem fairly obvious. In their late teens, many women change their residence because of marriage; and after 65, they may be migrating to Florida or California, after their husbands have retired or they themselves are widowed.

Whites and nonwhites have also been moving in different degrees. In 1950-51, 3.7 percent of the white population moved from one State to another, compared with 2.0 percent of the nonwhites. By 1958, however, the proportion among nonwhites had risen to 3 percent, while that among whites had declined to 3.4 percent. The most notable rise in migration among nonwhites began in 1956. These figures bear out the general observation of the northward migration of Negroes, reflecting, in part, the growth of job opportunities in the industrial North and West, and the decline in the ability of agriculture to absorb labor, a phenomenon which is general throughout the country.

The tendency of the better educated to be more mobile is shown clearly by census data. Nationally, in 1950, only 4 percent of those with no more than a grade school education moved, compared with 6 percent among high school graduates and 10.5 percent among college graduates. The census of 1960 is expected to show a similar pattern.

Reasons for Moving

Perhaps more important than statistics on physical movement is the question of why people move. A major reason is to seek employment or to find a better job. Recent statistics indicate that although less than 4 percent of the entire labor force moved between States and 3.5 percent moved between counties in 1958, 6.5 percent of the unemployed made interstate moves and another 5 percent moved from one county to another. The only group that moved more frequently than the unemployed were those in the Armed Forces; and these, too, can be said to have moved in connection with employment.

Numerous case studies, as well as general statistics, show the influence of the need for work on inducing men to move. According to a recent study, sponsored by the Bureau of Labor Statistics, of a plant shutdown in an Illinois community, 40 percent of the laid-off workers who were employed on new jobs 2 years after layoff had either left the community to get them or were commuting long distances to work every day. Another recent study dealing with the opposite situation--the opening of a major new plant in a depressed rural area--again showed that people were willing to move from one State to another or to commute long distances to get jobs. Thirty-five percent of the workers employed in this plant shortly after it opened came from outside the State and another 17 percent from distances of more than 50 miles within the same State.

A specific illustration of job-connected mobility appears in a 1954 Bureau of Labor Statistics study of electronic technicians, one of the newest skilled occupations. Altogether, 20 percent of the 2,000 electronic technicians interviewed had moved from one city to another, over a 12-year period--12 percent of them made one move, 5 percent made two shifts, and another 3 percent made from three to five shifts.

Among these movers was a young man who had first worked as a truck-driver in a small town in Oregon after completing high school. After about a year on that job, he moved to New Mexico, where he learned carpentry work in a contracting firm. After another year or so, his newly acquired skill enabled him to move to Colorado, where he got a job as a carpenter with

an industrial firm. Like many other young men of his age group, his next move brought him into the Armed Forces where he was assigned to an anti-aircraft unit. Upon release from the Armed Forces, he returned to Colorado, where he worked for a year as a carpenter. However, his basic interest in electronics repair work (probably resulting from his service experience) led him to avail himself of the opportunities for education and training under the GI bill of rights. To do so, he moved to Washington, D.C., where he completed a course of training which qualified him as an electronic technician. After working about a year in Washington, a desire to be closer to his family impelled him to seek a job on the west coast. Moving out to California, he readily found work as an electronic tester for an aircraft company.

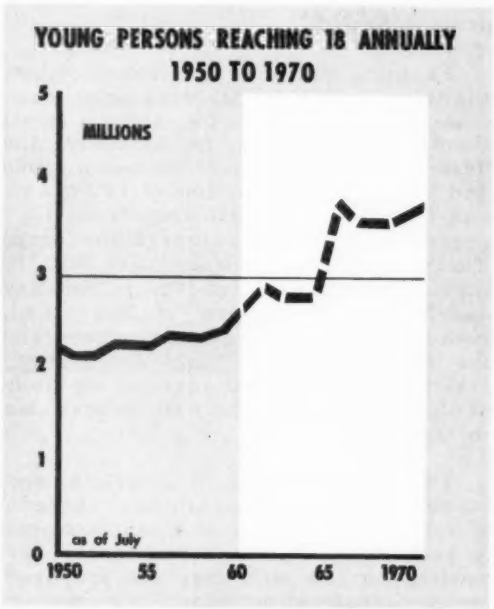
The movement of this young man provides a vivid picture of the way in which geographic mobility contributes to a higher degree of job and personal satisfaction for the individual and provides a qualified labor force. The acquisition of his new skill as a technician enabled him to change his job for personal reasons. At the same time, a manufacturer, probably faced with a limited supply of qualified workers in his own community, was able to obtain an employee with a much needed skill.

The experience of this young man also illustrates another point in connection with job-connected migration. In many instances of migration, the determining factor may not be the desire of an individual to get a job or to improve his job status, but may be an entirely personal reason, such as climate, location of family, health, or just plain wanderlust. Nevertheless, the fact that there are job opportunities in various sections of the country makes it easier for such workers to migrate.

This example, however, illustrates the cheerful side of the mobility-for-jobs story. The movement of migrant farmworkers, on the other hand, is usually not a matter of personal choice. Each year, almost half a million migrants work their way up the east coast from Florida to New York, or from Texas to Michigan, or from other parts of the Southwest to California and Oregon and Washington, harvesting fruits and vegetables. Low wages and poor living conditions are the lot of most of them. The 1960 White House Conference on Children and Youth paid particular attention to the problems of this group and the need for more adequate provision of social and educational services for them, and especially for their children.

The Future

As previously noted, young people show the greatest inclination to move. This tendency may well increase the overall rate of mobility in the years ahead because of the big change in the Nation's population and labor force that will take place in the 1960's. In this decade, there will be a dramatic increase in the numbers of maturing young people--those who were born during the 1940's and especially after the end of World War II. The chart indicates the waves of oncoming working-age youth--the gradual rise during the 1950's,



the acceleration occurring right now, the sharp rise between 1964 and 1965, and the maintenance of that level through 1970. Counselors, school personnel, and others interested in the well-being of the Nation's youth are in a position to help the young people who will reach age 18 during the 1960's to make an informed decision as to what they want to do occupationally and where they want to live.

Varying rates of growth in different industries and occupations, as well as the establishment or relocation of industrial plants, will be major stimulants to geographic mobility of workers during the next decade. Increasing numbers and proportions of white-collar (professional, technical, managerial, and clerical) personnel and service workers will be in demand. Skilled and semiskilled blue-collar workers will increase numerically but will make up a smaller proportion of the total labor force in 1970 than in 1950. Unskilled workers, on the other hand, will find the going tougher and tougher. Industrial laborers, despite a great expansion in the labor force, will barely hold their own in numbers, and will decline to less than 5 percent of the total labor force in 1970, compared with about 6 percent in 1950.

Farming will offer the fewest opportunities for jobs. Mechanization continues in agriculture, and the small farmer is becoming, vocationally, the "vanishing American." Between 1950 and 1970, the proportion of farmers and farm laborers will drop from 12.5 percent to 6 percent of our labor force. Therefore, many rural youth will be moving to cities to find jobs in industry and business. In view of this trend, both the Department of Agriculture and the Department of Labor are already trying to counsel rural youth on the kinds of off-the-farm jobs that will be available in the future.

These projections of industrial and occupational change can be either banners of hope or harbingers of disappointment to youth entering the labor force, depending on how well they are prepared for the accelerating industrialization of society in the years ahead. The adequacy of their preparation will depend in part upon the availability and quality of educational facilities--and this varies markedly in different sections of the Nation--and in part upon youth's own realization of the situation and its willingness to assume the responsibility for getting the necessary preparation.

Some Implications

In the past decade, the West and Southwest have generally gained more new industrial plants than the other sections of the country. As industries continue to shift in these directions, the population will follow them for greater job opportunities. And it will be the young, in most cases, who will be seeking out new places to work and to live.

With so many people crisscrossing the country, impelled by a variety of motivations, many financial and psychological problems are bound to arise. This is especially true of minority groups, such as the Puerto Ricans, who flock into our large cities without jobs, without resources, and, in many cases, without a knowledge of the English language. Children of all mobile people are likely to suffer to some extent by such uprooting. Even adults who move from one region of the country to another may have difficulties adjusting to radically different community and social attitudes. The communities into which the 10 million migrants move annually also have many difficult problems of adjustment, probably as severe as those of the migrants. They are expected not only to welcome the strangers within their gates but also to supply schools, housing, water, stores, and social services of all kinds.

Without minimizing the inevitable difficulties faced by a population on the move, this article has emphasized the positive aspects of mobility, because of its dynamism in our continuing national development--what it can bring in the way of greater economic opportunity; what it reflects of our industrial expansion; and how much the Nation must rely upon its young people and their ambitions to keep the country growing.

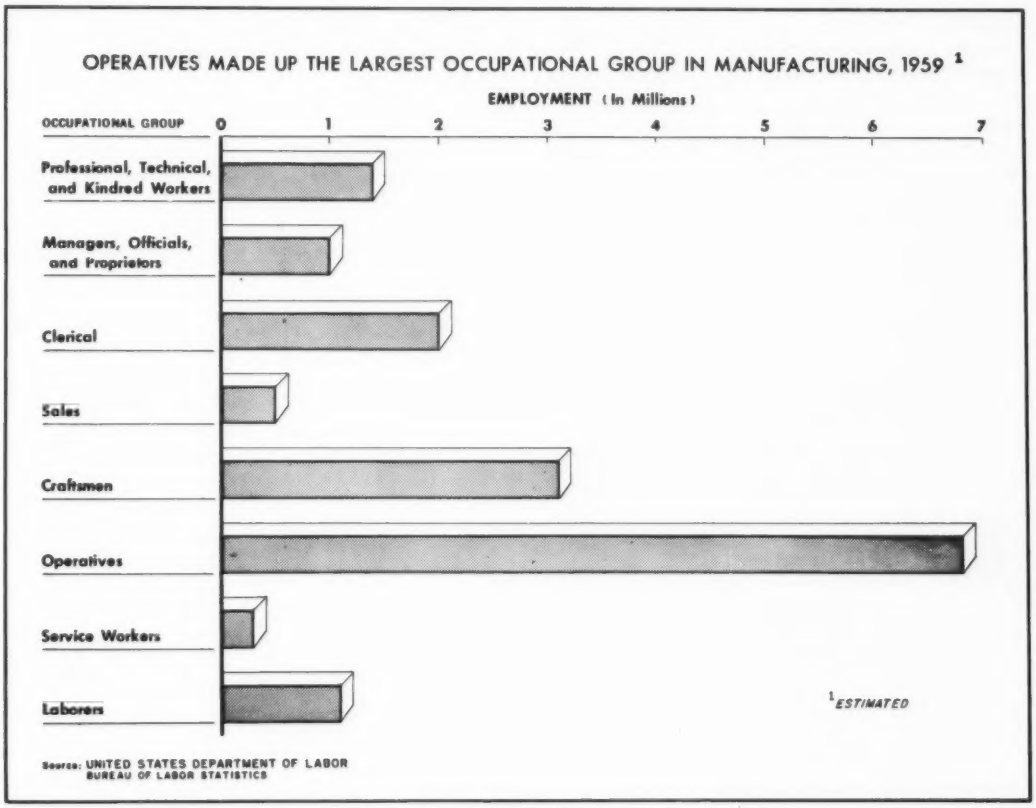
EMPLOYMENT OPPORTUNITIES FOR FACTORY OPERATIVES

by Ian R. Sutherland

About 19 million young people with a high school education or less are expected to enter the world of work during the 1960's. A major source of employment for these young workers will be operative jobs in manufacturing industries.

Factory operatives do many different kinds of semiskilled work in industrial plants. For the most part, they are employed in jobs directly concerned with the making of products. The majority operate some type of machine or equipment. Many of the others are engaged in assembling or inspecting products. The jobs they perform usually require only a short period of training and limited experience and education.

Of the $65\frac{1}{2}$ million workers employed in 1959, about 16 million earned their living in factories. Workers in many different occupations help to produce the millions of automobiles, television sets, machines, dresses, books, and numerous other products made in our factories. The largest occupational group found in factories in 1959 was the 7 million operatives who are the subject of this article. (See chart.)



Although all manufacturing industries employ operatives, some have many more of these workers than do others. (See table.) Large numbers of operatives are generally employed in those industries where manufacturing processes can be divided into relatively simple operations. For example, in July 1959, the apparel industry employed about 900,000 operatives--many of whom were sewing machine operators--and the transportation equipment industry, made up chiefly of workers engaged in automobile and aircraft manufacturing, employed more than 730,000. On the other hand, the printing industry, which is a very large employer of skilled workers (craftsmen), employed only 155,000 operatives.

Many operative jobs in factories require a high degree of hand skills and are not physically hard; as a result, many women are employed in these jobs. Nearly two out of every five factory operatives in 1959 were women. Indeed, operative jobs are by far the largest source of employment for women in manufacturing.

Sewing machine operator at work

Employment of operatives in manufacturing industries, July 1959

Industry	Total employment (thousands)	Total operatives	
		Number (thousands)	Percent of total employment in the industry
Total manufacturing industries	16,410	7,063	43.0
Apparel and other finished textile products	1,179	904	76.7
Transportation equipment	1,693	732	43.2
Food and kindred products	1,516	682	45.0
Textile-mill products	965	672	69.6
Machinery (except electrical)	1,634	551	33.7
Fabricated metal products	1,084	499	46.0
Electrical machinery	1,242	492	39.6
Primary metal industries	1,266	383	30.3
Chemicals and allied products	848	243	28.7
Stone, clay, and glass products	566	214	37.8
Lumber and wood products	694	182	26.2
Furniture and fixtures	382	171	44.8
Printing, publishing, and allied industries	865	155	17.9
Instruments and related products	339	111	32.7
All other manufacturing industries	2,137	1,072	50.2

Source: U.S. Department of Labor, Bureau of Labor Statistics.

Machine tool operator adjusting lathe

The number of women operatives employed in the different manufacturing industries varies considerably. For example, in 1959, women operatives accounted for about 8 out of 10 employees (750,000) in the apparel industry. Other manufacturing industries with large numbers of women operatives were textiles and food. On the other hand, plants which produce iron and steel and petroleum products employed relatively few women.

Nature of Work

Although the work performed by operatives in factories is quite varied, their jobs have some things in common. In general, workers in operative jobs work with their hands. Many of the jobs require the same motions during the working day. Most require only a brief period of on-the-job training. For the most part, operatives are closely supervised and told exactly what to do and how to do it. As a rule, they are required to reach a certain speed and quality of production.

Millions of these factory workers operate power-driven machines. Many use sewing machines to produce clothing, awnings, and other items. Others operate machines to stamp out metal parts still others use machine tools, such as engine lathes and milling machines, to shape metal to precise sizes. A considerable number of factory workers operate material-moving equipment such as power trucks to move heavy and large amounts of raw materials and manufactured products and parts.

Large numbers of operatives are employed as assemblers and inspectors. Assemblers fit parts together to make units such as a section or subsection of a radio or television set. Inspectors examine and test products to find out whether their quality is satisfactory. Many operatives in factories are employed as helpers or assistants to more skilled workers. For example, stationary firemen assist skilled stationary engineers in the operation and maintenance of steam boilers.

Operatives use a limited variety of handtools and equipment. Among these are screwdrivers, pliers, files, soldering irons, measuring devices, and cutting tools. Many of these workers also make adjustments and do minor maintenance work on the machines they use. Some are required to keep simple records of their work.

Where Employed

Factory operatives generally are employed in large numbers in mass production industries where the jobs can be divided into relatively simple operations. Of approximately 7 million workers employed in factory operative jobs in July 1959, about half worked in plants which manufacture men's and women's clothing and other apparel; automobiles, automobile parts, trucks, and aircraft; food; textiles, such as cotton and wool; and machinery. The remainder were employed in industries which manufacture items such as electrical machinery, wood products and furniture, and fabricated metal products.

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Factory operatives are employed in every State, city, and industrial center in the Nation. Six States have particularly large numbers of these workers--New York, Pennsylvania, Illinois, Ohio, Michigan, and California.

Training, Other Qualifications, and Advancement

Most factory operatives learn their jobs informally by "picking up" their skills on the job. In many plants, a new or unskilled worker starts his training by observing the work done by an experienced employee. Later, he does the more simple and routine work under the close supervision of an experienced worker. It generally takes a trainee from a few days to a few months to master the requirements of the job. In some jobs, however, the training period may be as little as a few hours, or as long as a year or more.

Most employers of operatives require only that the new employee be physically able to perform the job, learn its requirements, and be dependable. These employers prefer workers who are able to do routine, production-line work at a steady and fast pace. Some employers prefer applicants who are familiar with different types of factory work, such as machine shop work, woodworking, riveting, and welding. A few employers--usually large companies--use tests to determine whether applicants have aptitudes such as manual dexterity and good eye-hand coordination. A growing number of employers prefer to employ young people with a high school or trade school education and often look for workers who have had courses in mathematics and blueprint reading.

Advancement opportunities are limited in most operative jobs, although many workers have advanced to higher paying operative jobs. Some operatives pick up a variety of work experience by moving from job to job in one shop or by moving from one employer to another. In acquiring this experience, these workers often learn the various operations of a trade and become skilled craftsmen. Some operatives start as helpers to craftsmen and learn the trade by observing and assisting the skilled worker. Many of these helpers eventually become craftsmen. Some of the craftsmen who learned their skills in an informal way have taken courses related to their trade in vocational schools.

Welding machine operator using a semi-automatic welding machine to weld steel pipes

In a few industries, such as automobile manufacturing, some operatives are given an opportunity to enter apprenticeship training programs to become skilled workers. These programs consist of formal on-the-job training (which lasts about 3 or 4 years) and related classroom instruction, during which the apprentice learns all about the trade. In other industries, such as industrial chemicals and petroleum refining, new workers are hired as laborers. These workers, after acquiring sufficient experience and training, may move up to jobs as operatives or craftsmen. Only in rare instances are factory operatives able to gradually advance to technical and administrative jobs in manufacturing plants.

Employment Outlook

There will be hundreds of thousands of openings in factory operative jobs in

the 1960's. During this period, a growing demand for the products of our manufacturing industries is expected because of rising population, increasing incomes, and growing national defense needs. Thus, a growth in manufacturing employment is expected in the 1960's, and operative jobs will also expand.

Many thousands of job opportunities will result from the need to replace operatives who leave their jobs, retire, or die. This occupational group has a fairly high proportion of young workers and women workers, and many of them will leave their jobs. Young workers, as a group, tend to change jobs more often than do older workers. Many women operatives leave their jobs to get married, raise families, or move to other areas when their husbands change jobs.

Employment of operatives in manufacturing industries will expand in the 1960's, but the rate of increase will probably not be so fast as that for total manufacturing employment, largely because of recent improvements in manufacturing processes. These advances, popularly know as "automation," permit great gains in production without comparable gains in employment--particularly in operative jobs. Although technological developments will slow down the rate of growth of operative employment, many plants which are today relatively unmechanized and may remain so will require additional operatives. Finally, changing technology probably will create many new types of operative jobs.

The employment of operatives will expand more rapidly in some manufacturing industries than in others during the 1960's. For example, the employment of operatives will increase greatly by 1970 in the electrical industry (producers of electric motors and electronic equipment such as radio and television sets), in the machinery industry (producers of engines and metalworking and industrial machinery such as lathes and milling machines), and in the apparel industry (producers of garments such as dresses, suits, and coats). Although total employment of operatives may decrease in some industries which now employ large numbers of these workers, such as the textile industry, the need to replace workers who leave their jobs, retire, or die will create many thousands of operative job opportunities for young workers in these industries.

Employment is also expected to increase faster in some operative jobs than in others. For example, the employment of semiskilled machine welding operators, oxygen and arc cutters, and power truck operators is expected to expand at a faster rate than most other operative jobs. Employment of stationary firemen and production painters, on the other hand, is expected to increase only slightly.

During periods of decline in manufacturing activity, operatives are more likely to lose their jobs than craftsmen or white-collar employees. This is true because employers are reluctant to lay off their skilled employees who, compared with operatives, cannot be so readily rehired when business improves. Operatives also tend to be unemployed, BLS studies show, for longer periods of time than do most other workers, and they are generally rehired later than workers in many other types of jobs.

Fork lift truck operator moving a heavy load of material

On the other hand, because of limited training requirements, operatives can more readily shift to different jobs at the same level than can many other workers at higher skill levels. Should they lose their jobs in an industry or in a particular field or work, operatives can easily write off their smaller investment in training and experience in their past job and, after a brief period of additional training, learn a new operative job.

Earnings and Working Conditions

Earnings of factory operatives vary widely, depending on the jobs they have, the size and location of the plant in which they are employed, the method of wage payment (hourly or piece rates), and individual ability. Although some operatives who are paid on the basis of the number of items they produce are among the highest paid manual workers in manufacturing industries, earnings of operatives as a group are somewhat below skilled craftsmen. For example, male operatives in plants manufacturing durable goods averaged $4,750 in 1958, compared with the $5,200 average earnings of craftsmen in all industries (both manufacturing and nonmanufacturing). Women operatives generally earned less than men.

The working conditions of factory operatives differ according to the industry in which they are employed and the job being performed. For example, assemblers of specialized electronic equipment may work seated at a table in an air-conditioned, dust-free room; on the other hand, a machine tool operator may stand next to a high-speed machine tool in a noisy machine shop with metal chips and lubricating oil in the work area. Some of these workers are subject to job hazards because they work with sharp cutting tools and other equipment which can be dangerous if used incorrectly. Consequently, safety instructions are often an important part of operative job training.

Many operatives belong to labor unions and are covered by collective bargaining agreements negotiated between employers and unions. These contracts usually include provisions for benefits such as paid holidays and vacations, hospitalization, medical and surgical insurance, life insurance, sickness and accident insurance, and retirement pensions.

CAREERS IN BUSINESS MANAGEMENT

A new 20-page report presents an overall view of management positions in private industry with emphasis on beginning jobs and ladders of advancement. It describes the employment outlook for these positions, and gives information on the nature of the work, training and other qualifications, and earnings and working conditions. A discussion of entry jobs and lines of advancement in managerial work is given for the following departments:

- Finance and accounting
- Market research
- Purchasing
- Traffic
- Production research sales
- Legal
- Personnel and industrial relations
- Advertising
- Public relations

Careers in Business Management, VA Pamphlet 22-7, was prepared by the Bureau of Labor Statistics, U.S. Department of Labor, in cooperation with the Veterans Administration. It is for sale by the Superintendent of Documents, Washington 25, D.C., for 20 cents a copy.

COUNSELING AND EDUCATION OF THE VETERAN

by Bradford Morse*
Veterans Administration

Of the 20 million servicemen discharged by the armed services since 1945, nearly 11 million have received educational benefits under the veteran's education and rehabilitation laws administered by the Veterans Administration. Out of this latter group, a third of the World War II veterans and half of the Korean veterans entered a college or university. Still to be evaluated are the pervasive effects of this program on the general level of education, the Nation's skilled manpower resources, and our national security.

A Brief Background

Ever since the Revolutionary War, various benefits have been provided to American veterans. It was not until 1918, however, that the Congress passed vocational rehabilitation legislation in an endeavor to restore to useful employment those veterans who had suffered injury or disablement. Today, vocational rehabilitation is a key part of the country's carefully planned program for disabled veterans.

Nearly 180,000 veterans entered rehabilitation training following World War I. The subsequent success of the Government in operating large-scale rehabilitation programs had its roots in the experience gained from 1918 to 1928. In that period, Veterans Bureau employees established employment objectives and initiated training procedures for disabled veterans, supervised the individual's training, modified training as necessary, and investigated employment possibilities. In addition to utilizing the resources of existing schools and establishments, the Bureau also organized and staffed its own vocational schools. These schools were designed for veterans whose disabilities or lack of educational background indicated a need for special adjustment training not available elsewhere.

Out of the World War I rehabilitation experience, there emerged a number of guiding principles, namely: To apply the best scientific knowledge and methods available in the vocational counseling and rehabilitation program; to use existing educational facilities and establishments; to work as partners with the country's educational institutions--not to control or instruct but to use their facilities to the advantage of the individual veteran.

The New Programs

The new programs have included a vocational rehabilitation program and training program for both World War II and Korean Conflict veterans.[1] The current vocational rehabilitation program is a lineal descendant of World War I rehabilitation activities. Although it has profited from notable advances in applied psychology, essentially it has presented problems which have been encountered before.

This was not the case with the World War II "GI bill," the first law to provide education and training benefits to veterans in general. Over 16 million servicemen were in uniform during World War II, constituting practically a whole generation of Americans. At the end of the war, the return of millions of servicemen to civilian life presented a great challenge to the Nation. To meet this challenge, the Servicemen's Readjustment Act of 1944 provided for unemployment and self-employment allowances, loan guaranty benefits, and educational and training benefits. The educational benefits were based on the

*Mr. Morse is Deputy Administrator of Veterans Affairs.

[1]In addition to benefits for veterans, the VA is responsible for providing educational assistance to war orphans.

For additional information on the VA counseling program, see C. Harold McCully, Developments of a Decade of VA Counseling (in Personnel Guidance Journal, Sept. 1957, pp. 21-27).

principle that men whose lives had been interrupted by military service were entitled to governmental assistance that would enable them to return to or begin their education or training.

Of the nearly 11 million veterans who have taken advantage of the World War II and Korean Conflict vocational rehabilitation and education and training benefits, 3.5 million have attended colleges or universities, 4.4 million have attended schools below college level, 1.8 million have trained in apprenticeship or other on-the-job programs, and the others have received institutional on-farm training.

Colleges and universities contributed to the vocational rehabilitation and training of many veterans in ways not accounted for by statistical data. VA guidance centers based at the universities provided counseling service, not only for those who enrolled in college, but also for veterans who pursued other than college training. Veterans pursuing apprenticeship or other on-the-job training were aided through use of school facilities, such as speech correction and reading clinics. Agricultural extension teachers provided the academic training for some of the on-farm trainees, and extension divisions conducted correspondence courses for many veterans in the group of on-the-job trainees and apprentices.

Veterans' Education--A Cooperative Effort

No undertaking of so great a scope and magnitude as the veterans' education and rehabilitation program could have been accomplished by any one agency or institution. Some of the cooperative efforts and relationships essential to its success are described below.

Aptitude testing is part of the vocational counseling program

Advisory Committees. A legislatively authorized Advisory Committee to the Veterans Administration came into being on September 7, 1944. At this writing, it consists of 17 ranking representatives of higher education, industry, labor, State departments of public instruction, vocational education, the U.S. Department of Labor, and the Office of Education in the U.S. Department of Health, Education, and Welfare.

To the Committee, the Administrator of Veteran Affairs and his staff have brought problems of public policy and asked for advice on key problems in the operation of this vast program. In its 55 meetings the committee has reviewed legislative proposals and offered its opinion on pending bills to the Congress.

In addition to utilizing the assistance of the statutory Advisory Committee in matters of public policy, the Vocational Rehabilitation and Education Service sought technical assistance through a Counseling Advisory Committee, which consists of three leaders in the field of counseling psychology appointed by the Administrator under permissive legislation. To this committee, technical staff brought problems of professional standards and training for counseling personnel and of counseling and rehabilitation methods and practices. The Committee has helped to insure that VA's counseling and rehabilitation practices are maintained on a sound and progressive basis.

Approval of Courses. The traditional relationship between the Federal Government and the States in education is reflected in the safeguards erected in the veterans' education laws. Approval of institutions and facilities which offered education and training was clearly established as a function of the various States. However, the Administrator of Veterans Affairs was authorized to approve institutions when a State did not exercise its approval function. He was also required to formulate regulations governing payments to schools and veteran enrollees.

Cooperative approaches to problems also had to be developed in the field of higher education. For example, the law authorized the institution to fix rates of tuition on a fair and reasonable basis if it had no established tuition or if its rate was inadequate. But what was a fair and reasonable rate when the school had to double its faculty and its facilities?

The difficulties faced by the Veterans Administration, the State approving agencies, and the schools were presented to the Congress. Aided by new legislation and the cooperation of the great majority of schools, employers, and the veterans themselves, the State approving agencies and the Veterans Administration were able to eliminate most of the abuses and solve all major problems that threatened the success of the GI training program.

The Guidance Center Approach. In the rehabilitation and education programs for World War II and Korean veterans, it was determined that scientifically based vocational counseling would be made an integral part of rehabilitation services and would be provided on request to veterans seeking educational benefits. But it was easier to indicate the desirable shape of things than to bring them into effect. Trained psychological personnel are in short supply today; they were most difficult to secure in the mid-1940's. With limited personnel, therefore, the country faced a problem of providing systematic vocational counseling to veterans in a program that at its peak in 1947 counseled 50,000 veterans a month.

Veterans Administration guidance centers were established at a number of colleges and universities. Standards were established by the VA for the work to be done by psychologists employed by the universities. At the peak in 1947, there were 415 VA guidance centers at the same number of institutions of higher learning throughout the country.

Through this cooperative effort, a vital service was provided to veterans close to their homes and places of training on a scale which previous experience would have denied to be feasible. In the period from 1943 to 1960, ap-

proximately 3 million veterans received vocational counseling, and 75 percent of this workload was carried by the guidance centers at the colleges and universities.

Occupational Outlook Information

In vocational counseling, psychological assessment and analysis of the individual is complemented by analysis of occupations and by projections of occupational trends for both the short and the long term. The need for sound knowledge of occupational trends was foreseen in legislation establishing the vocational rehabilitation and education program, which directed the Administrator of Veterans Affairs to make available to veterans current and reliable information on occupations.

Since 1945, the Vocational Rehabilitation and Education Service has cooperated continuously with the Bureau of Labor Statistics, U.S. Department of Labor, in publishing occupational outlook information. The VR & E Service provides advice, from a technical counseling and training standpoint, for these cooperative publications. The Assistant Director for Vocational Counseling, Training, and Adjustment is a member of the National Advisory Committee to the BLS Occupational Outlook Service.

In this country, all concerned with vocational counseling are familiar with one of the Government Printing Office's best sellers, the Occupational Outlook Handbook. Its first edition was published in 1945 as a VA handbook. The Handbook, since prepared and published by the Bureau of Labor Statistics, is revised periodically and supplemented by the Occupational Outlook Quarterly and various interim materials. Colleges, universities, and secondary schools throughout the Nation increasingly rely on these materials in their counseling and student personnel programs.

Contribution to the Nation's Manpower Resources

Has the veterans' rehabilitation and education helped to meet the Nation's needs for trained manpower? Although there is no complete answer to this question, probably as good an answer as any is contained in the report of the President's Commission on Veterans' Pensions, published in September 1956:

> The serious depletion of trained personnel resulting from World War II has been largely offset by the incentives created by the GI bill of rights. We have produced hundreds of thousands of technicians, doctors, lawyers, engineers, craftsmen, farmers, and business workers. These trained men and women represent a great national asset....
>
> The veterans' educational program was a major contribution to the national welfare, and the country would be weaker educationally, economically, and in terms of national defense, if educators, veterans' organizations, the President, and the Congress had not seen fit to embark upon this new and momentous educational enterprise.

As noted, college training in a great variety of fields has been provided to 3.5 million veterans. A number of critical fields, however, deserve highlighting: Nearly 500,000 veterans have received training in engineering; 134,000, in physical and natural sciences; 371,000, in teacher education programs; and 209,000, in medical and related sciences, including 77,000 in professional medical courses. Without the men trained under veterans' programs, shortages in these fields would be much more severe than they are.

Of the total number of veterans who entered training, 676,000 pursued courses of vocational rehabilitation. Many of these disabled veterans were seriously handicapped. VA rehabilitation efforts with this group have not only resulted in incalculable benefits to the individuals, but have also provided a striking demonstration of the potential inherent in this hitherto largely untapped manpower resource.

A rehabilitated veteran works as a disc jockey and radio repairman in a VA hospital radio station

Impact on Student Personnel Work

Without the help of the VA guidance centers at the colleges and universities, it would have been impossible to meet veterans' needs for sound counseling service. And it soon became clear that there was a reciprocal effect. Many cooperating institutions that established centers at the request of the Veterans Administration found it advantageous to use guidance centers for referrals from the entire student body.

The give and take between VA and university personnel, discussion of professional and technical problems, examination of VA standards for counseling--all of these provided influences of considerable importance for the institutions concerned. The centers became demonstration units of what can be accomplished in vocational and psychological counseling. Colleges and universities quickly recognized their value. Thus, in 1948 at the National Education Association's Conference on Higher Education, one group expressed the opinion that the VA guidance center program had advanced counseling by 15 to 20 years in their institutions. In the following year, the American Council on Education released the results of a formal study of the influence of the guidance center program on student personnel services.

Dean Mitchell Dreese, Professor of Educational Psychology at George Washington University reported, in the Educational Record for October 1949, that more than half of the institutions cooperating in the study had no centrally organized counseling service before the establishment of the VA guidance centers on their campuses. Further, he reported general agreement that "the VA guidance center has demonstrated the value of testing and vocational counseling as an organized service which we wish to incorporate into our program of student personnel service." In fact, 150 out of 154 institutions reported that they were planning to continue the counseling services after the VA contract was discontinued. Most of them planned to make counseling available to all their students, and more than a third of the institutions planned to offer counseling services to other citizens of the community.

After presenting his detailed findings, Dr. Dreese concluded: "It is conservative to say that the VA college guidance center program, with its 415 demonstration centers, in the short space of 4 years has advanced the cause of vocational guidance on the college and university level by more than 15 years of normal development. Should the Federal Government at any time in the future initiate an extensive program of scholarships such as provided under the GI bill, it is almost a certainty that such a program would be implemented by a testing and counseling service. Amazing progress has been made in testing and vocational counseling on the college and university level during the past 4 years, and the future looks good."

In Perspective

Past fears about the ability of the returning veterans to adjust to the classroom and study hall have proved unwarranted. The story of veterans' accomplishments in school is recorded in the experience of school and college personnel. It is clear that the veterans did as well as or better than nonveterans.

The effects of these vast programs on numerous other facets of social, economic, and cultural life remain for thoughtful consideration and assessment. At this time, the data for a complete evaluation are lacking. Yet it stands to reason that this multibillion-dollar program affecting millions of persons must have had profound effects.

A central tenet in our way of life is that an informed citizenry is essential for democratic government. Education is an obvious means to this end. The awareness of cultural and aesthetic values must be increasing as a result of this program.

Educational techniques, and perhaps also basic educational philosophy, have been affected in many specific ways. Although experimentation in admission practices was under way before the veteran influx, it was shown that, when the need arose, useful changes could be made to the enrichment rather than the disadvantage of formal education. The effect on our economy, in terms of manpower skills and competence, increased earning power, greater tax returns, and increase in gross national product, may be all but inestimable, but the effect is there.

On the whole, we have dealt with the veteran of our wars in rehabilitation and education, as in other benefit programs, in such a manner as to enrich him in many critical ways. And the Nation is richer for it.

EMPLOYMENT OUTLOOK FOR APPLIANCE SERVICEMEN*

When washing machines, refrigerators, toasters, and the dozens of other appliances used in homes today do not run properly, appliance servicemen repair them. Every year more appliances are used in homes. Appliances have become more convenient and easier to use, but they have also become more complicated. The repair of large and complicated appliances such as refrigerators and washing machines (which may have as many as thirty electrical connections in the control unit alone) is, of course, considerably more difficult than the repair of small appliances such as toasters and food mixers. However, all the work performed by appliance servicemen involves finding why appliances are not operating properly and then installing new parts or making adjustments.

Nature of Work

To learn why an appliance is not operating properly, appliance servicemen first ask the customer to describe what happened when it was last turned on. They often check the appliance by starting it and then listening for loud humming, grinding sounds, or other unusual noises. These often tell experienced servicemen what part of the appliance is not working properly. Sometimes servicemen look for common signs of trouble, such as cracks in rubber hose, or they turn gears or other moving parts to see if they are jammed or too tight. Appliance servicemen find other causes of trouble by using special tools and testing devices.

After servicemen find what is wrong with appliances, they make the necessary repairs. Frequently, this involves replacing parts, such as electric cords, that receive extra hard wear. Sometimes servicemen clean parts; for example, they remove lint that has clogged a washing machine drain. In removing old parts and putting in new parts, appliance servicemen use handtools such as screwdrivers, pliers, and wrenches, and special tools designed for particular appliances.

An important part of the work of appliance servicemen is dealing personally with customers. They often answer customers' complaints about their appliances. Appliance servicemen frequently advise customers about the care and use of their appliances, because many breakdowns are caused by improper use. For example, they may remind housewives how many pounds of clothing can be washed at one time in automatic washing machines, or how to stack dishes in dishwashers.

Serviceman checking timer of combination washer and dryer

*This article is one of a series of reports on fields of work which could not be covered in the 1959 edition of the Occupational Outlook Handbook. It is part of the Bureau's continuing program of occupational research.

The work of appliance servicemen has considerable variety. They drive light trucks or automobiles, some of which are equipped with two-way radios. They give estimates to customers of the costs of repair jobs and keep records of parts used and hours worked on each repair job. Also, they sometimes order parts and sell new or used appliances.

Where Employed

Approximately 150,000 appliance servicemen were employed in 1960. They worked in almost every city and town because the appliances they repair are used everywhere. About 105,000 servicemen were employed by appliance, furniture, and department stores, and by other firms that sell and service appliances. Independent repair shops, many of which were owned and operated by servicemen, employed about 25,000 of these workers. Another 15,000 servicemen were employed by gas and electric companies. A few thousand worked for the manufacturers of appliances who operate service centers in most large cities. Some appliance servicemen are employed by companies that install and maintain coin-operated washing machines in apartment houses and self-service laundries.

Training, Other Qualifications, and Advancement

Appliance servicemen are usually hired as helpers and acquire their skills through on-the-job training and work experience. Inexperienced men are given relatively simple work assignments. In some companies, the work for the first few months consists mainly of helping to install appliances in customers' homes, driving service trucks, and learning street locations. In other companies, they begin to learn the skills of appliance servicemen by working in the shop, where they rebuild used parts such as washing machine transmissions. Gradually, trainees learn how motors, gears, and other appliance parts operate. They progress from simple repair jobs, such as replacing a switch, to more difficult jobs, such as adjusting automatic washing machine controls. In addition to practical experience on the job, trainees frequently receive classroom instruction given by appliance manufacturers and local distributors. Many trainees take correspondence courses in basic electricity to increase their skills in appliance repair.

Trainees are usually supervised closely for 6 to 12 months. By this time, most of them can repair several kinds of appliances on their own, and they may be given responsibility for their own service trucks and for expensive stocks of appliance parts and tools. Appliance servicemen usually need up to 3 years' on-the-job experience to become fully qualified. Many experienced servicemen attend training classes (often on company time) and study service manuals to become familiar with new appliances and the best ways to repair them.

Employers generally prefer applicants who are high school graduates and who have had high school or vocational school courses in electricity or in physics. They must understand, in a practical way, how to use equipment that measures electricity and be able to use such measurements in solving equations or formulas that tell whether electrical currents in appliances are flowing properly. Also important in servicing appliances is a knowledge of wiring diagrams which show electrical connections between appliance parts.

Employers also look for men who can get along well with customers. Employers emphasize that mechanical skills are only part of the qualifications for servicemen's work. Servicemen must be tactful and courteous. Sometimes this is difficult, for example, when explaining to a customer the right way to operate an appliance that has been used incorrectly. Servicemen also are expected to dress neatly and to avoid getting grease or dirt on floors and furniture.

Appliance servicemen can be promoted to foreman, assistant service manager, or service manager. Preference is given to men who have shown

ability to get along well with other servicemen and with customers. A general knowledge of bookkeeping and other subjects related to managing a business is also helpful in getting ahead. Servicemen who work for appliance manufacturers may advance to other higher paying jobs. They may teach servicemen to repair new models of appliances. They may also write service manuals. Because of their experience in repairing appliances and dealing with all types of customers, appliance servicemen often become successful appliance salesmen. Experienced appliance servicemen may open their own repair shops.

Employment Outlook

Employment of appliance servicemen is expected to grow rapidly during the 1960's. Most new employment opportunities in this expanding occupation will occur because more appliances will be used and many new appliances will be more complex and require greater maintenance and repair. Some job openings will occur each year as a result of the need to replace servicemen who are promoted or who transfer to other fields of work. Other opportunities will arise because of the need to replace those workers who die or retire.

Serviceman installing new surface unit in an electric range

Appliances have become an essential part of our daily living. Some homes now have as many as 20 appliances. During the 1950's, increasing numbers of basic gas and electric appliances such as refrigerators, washing machines, air conditions, ranges, vacuum cleaners, food mixers, and heating pads were purchased. In addition, new appliances (electric can openers, for example) were introduced, and their use spread rapidly. Appliances that were not widely used 10 years ago, such as dishwashers, have become more popular.

Growing population and increasing numbers of young married adults, who spend large amounts of their incomes for furniture and appliances, will continue to stimulate demands for appliances during the 1960's. Appliance sales will also increase with rising incomes and standards of living. New and more complicated appliances, such as electronic ovens, as they become popular, will also result in the need for more appliance servicemen with higher levels of skill. Refrigerators and ovens that are set into walls or cabinets and other modern appliances that are more convenient and easier to operate, will be more widely used. Air conditioners will also be installed in many more homes during the 1960's.

Because the increasing complexity of many modern appliances has made appliance repair work more difficult, manufacturers are designing appliances with more durable parts that will need fewer repairs and appliances that can be taken apart and fixed more easily. In addition, appliance manufacturers and other employers are increasing the efficiency of servicemen through more widespread and more effective training. Despite these improvements, large numbers of servicemen will be needed each year.

Mechanically inclined young men who are not planning to attend college will find many opportunities in the growing appliance repair field. Servicemen who have a working knowledge of electricity, and especially those who know electronics, will be able to find a variety of good jobs almost everywhere. In addition, there will be more year-round jobs for servicemen. One reason is that more people are expected to sign yearly service contracts with companies which agree to keep their appliances in good operating condition.

Earnings and Working Conditions

National wage data are not available for appliance servicemen. Information obtained from several large employers in mid-1960 indicated that appliance servicemen generally receive from $95 to $115 for a 40-hour workweek. Some highly skilled men earned up to $125 a week. Trainees usually were paid from about $65 to $80 a week. Appliance servicemen who worked on large appliances generally earned more than those who worked only on small appliances. In shops where only small appliances were repaired, men often received a daily bonus when they repaired more than a certain minimum number of appliances. Many appliance servicemen work more than 40 hours a week and receive higher rates of pay for the overtime hours.

Many appliance servicemen working for manufacturers' service centers, gas and electric companies, and other employers received paid vacations and sick leave, health insurance, and other benefits, as well as credit toward retirement pensions. Some of these companies also sponsored employee savings funds and contributed money to the accounts of employees who participated.

The shops in which appliance servicemen work are relatively quiet, well lighted, and adequately ventilated. While repairing small appliances, servicemen usually sit at benches. Working conditions outside the shop vary considerably. Servicemen sometimes work in narrow spaces, uncomfortable positions, and in places that are not clean. Servicemen working with large appliances may spend 1 or 2 hours a day driving in all kinds of weather, between customers' homes and the shops where they work.

Appliance repair work is generally safe, although accidents are possible

while the serviceman is driving, handling electrical parts, or lifting or moving large appliances. Few accidents occur because inexperienced men are warned to use tools cautiously and to follow simple precautions against electric shock--for example, keeping their hands dry while handling electric wires.

The work of appliance servicemen is often performed with little direct supervision. This feature of the job may appeal to many young people.

SECRETARY MITCHELL URGES MORE PRESTIGE FOR SKILLED TRADES

Excerpt from an address by Secretary of Labor James P. Mitchell, Automotive Tool and Die Manufacturers' Association, Detroit, Michigan, May 19, 1960

"... there appear to be two basic errors in our thinking about career preparation, and ... these errors have had a tendency to rub off on the minds of our children. The first is that we tend to over concentrate on the college education, often at the expense of other, equally important courses of study. The second is that we fail to accord the trade and industrial careers the honor, the prestige, and the dignity which they merit.

"One result is that we see our college classrooms across the country crowded with young men and women who have no real, deep down desire to be there, and, hence, probably should not be there. Prodded by parents desirous of seeing their children receive a college degree, these reluctant scholars frequently yawn or play their way through four years of study, little better off at the finish in terms of their own work career preparation or the national need. Often they don't make graduation, drop out after a year or two, and begin an aimless drift, career-wise--unskilled for blue-collar work, untrained for higher-level white-collar work--unequipped for prideful, purposeful living.

"A partial solution to this problem might be found if we were to begin giving the mechanical and industrial trades a new degree of prestige and a just and realistic value label. It is a sad fact that in too many of our schools we have continued to regard our vocational programs of study as the dumping grounds for the slow learners and the disciplinary cases, rather than a conscious vehicle of preparation for a satisfying and contributing livelihood. Often the result has been a youth who doesn't make the grade as a skilled worker, or one who barely does, being generally ill-equipped to meet the demands that must be placed upon his ability. And so we often see a continued, and understandable, under these circumstances, aversion to the vocational courses on the part of brighter students with mechanical and industrial aptitudes, to say nothing of their parents.

"Here, I suggest, is another area of mutual interest for labor and management. What is taking place in our schools today, as well as ... under the joint apprenticeship program, will determine our flow of skilled workers in the years ahead. And if the skilled trades are being advertised to the school-aged youngster as being unattractive--a notion which any realist sees as a throwback to the 19th century--then certainly we can hold little hope of meeting our skill demands ...."

COUNSELING AND GUIDANCE TRAINING INSTITUTES IN 1960-61

Twenty-one National Defense Counseling and Guidance Training Institutes will be conducted at universities and colleges during the 1960-61 academic year. Six will operate during the full academic year; four of these will enroll students for both semesters, and two will enroll a separate group during each semester. The remaining 15 institutes will be conducted for less than a full school year, generally for one semester only; of these, 10 will be conducted in 1961 during the second semester of the school year.

Programs at these institutes (which are provided for in Title V, Part B, of the National Defense Education Act) will offer professional training for teachers who are preparing to engage in counseling and guidance of high school students and will provide additional training for present counselors to improve their qualifications. Most teachers attending the institutes during the coming year will have had some counselor training. In many instances, the additional training they receive at the institutes will enable them to complete their academic requirements for State certification as counselors.

To be eligible to attend the institutes, enrollees either must be employed by a secondary school and be spending at least half of their time in counseling and guidance; or they must be regularly employed secondary school teachers with graduate-level preparation in counseling and guidance who are actually planning to do counseling and guidance work in high school. All enrollees must be college graduates; some institutes may require a more advanced educational level.

The Federal Government assumes the cost of tuition for all enrollees. It also provides for stipends to enrollees from public schools, who receive $75 a week plus an allowance of $15 a week for each dependent; private school enrollees do not receive stipends.

About 800 secondary school teachers and counselors will attend the institutes, at a total cost to the Federal Government (including operation and stipends) of almost $2.4 million. About 3,000 teachers and counselors attended 84 short-term institutes held during the 1960 summer session, at a total cost of almost $3.1 million. According to an estimate by the U.S. Office of Education, the training provided to about 6,250 high school teachers or counselors by all NDEA institutes to be held over a 2-year period will directly benefit more than 2 million high-school students.

As a convenience to participants, the institutes were established at colleges and universities which are widely dispersed throughout the country. The colleges and universities were selected with the assistance of a panel of professional consultants in the field of counseling and guidance. Although the available funds do not permit the establishment of an institute in each State, attendance by enrollees from all States has been assured. The six full-year institutes will serve enrollees from major geographical regions. The other 15 institutes will serve those from their own and nearby States.

Persons interested in the counseling and guidance institutes in their vicinity may obtain additional information directly from the institute they wish to attend. Application should not be made directly to the U.S. Office of Education.

The colleges and universities which have agreed to sponsor the regular session institutes during the coming year, the approximate enrollment size of each institute, the dates of operation, and the directors are given on the following page.

Universities Conducting Institutes During Full Academic Year:

Atlanta University (Atlanta, Ga.); Dr. Paul I. Clifford, Director. First Group--31 enrollees; August 29, 1960-December 16, 1960. Second Group--31 enrollees; January 30, 1961-May 19, 1961.

Pennsylvania State University (University Park, Pa.); 30 enrollees; Septemper 12, 1960-June 10, 1961; Dr. George R. Hudson, Director.

University of Florida (Gainesville, Fla.); 30 enrollees; September 19, 1960-June 3, 1961; Dr. Robert O. Stripling, Director.

University of Minnesota (Minneapolis, Minn.); Dr. Willis E. Dugan, Director. First Group--30 enrollees; September 5, 1960-December 23, 1960. Second Group--30 enrollees; January 30, 1961-June 10, 1961.

University of Missouri (Columbia, Mo.); 30 enrollees; September 12, 1960-June 3, 1961; Dr. Paul C. Polmantier, Director.

University of Southern California (Los Angeles, Calif.); 32 enrollees; September 19, 1960-June 3, 1961; Dr. Earl F. Carnes, Director.

Colleges and Universities Conducting Institutes for Less Than Full Academic Year:

Arizona State University (Tempe, Ariz.); 25 enrollees; January 30, 1961-June 2, 1961; Dr. Sandford S. Davis, Director.

Boston University (Boston, Mass.); 25 enrollees; September 12, 1960-January 20, 1961, Dr. Dugald S. Arbuckle, Director.

College of the City of New York (New York City, N.Y.); 30 enrollees; September 26, 1960-January 21, 1961; Dr. Robert H. Mathewson, Director.

George Peabody College for Teachers (Nashville, Tenn.); 30 enrollees; January 30, 1961-May 27, 1961; Dr. William C. Rhodes, Director.

Michigan State University of Agriculture and Applied Science (East Lansing, Mich.); 40 enrollees; September 19, 1960-February 3, 1961; Dr. Buford Stefflre, Director.

Ohio State University (Columbus, Ohio); 38 enrollees; September 12, 1960-January 21, 1961; Dr. Herman J. Peters, Director.

Oregon State System of Higher Education (Portland, Oreg.), 25 enrollees; February 6, 1961-May 26, 1961; Dr. Daniel W. Fullmer, Director.

Purdue University (Lafayette, Ind.); 30 enrollees; January 30, 1961-June 2, 1961; Dr. Lee E. Isaacson, Director.

San Diego State College (San Diego, Calif.); 25 enrollees; September 19, 1960-January 20, 1961; Dr. David D. Malcolm, Director.

University of Denver (Denver, Colo.); 25 enrollees; January 3, 1961-June 9, 1961; Dr. Harry R. Moore, Director.

University of Georgia (Athens, Ga.); 30 enrollees; March 13, 1961-June 3, 1961; Dr. William B. King, Director.

University of North Dakota (Grand Forks, N. Dak.); 25 enrollees; February 6, 1961-June 3, 1961; Dr. Paul F. Munger, Director.

University of Texas (Austin, Tex.); 30 enrollees; January 30, 1961-June 3, 1961; Dr. Royal B. Embree, Jr., Director.

University of Wisconsin (Madison, Wis.); 26 enrollees; January 30, 1961-May 26, 1961; Dr. Gail F. Farwell, Director.

Washington State University (Pullman, Wash.); 25 enrollees; January 30, 1961-June 3, 1961; Dr. William P. McDougall, Director.

CAREERS FOR WOMEN IN THE BIOLOGICAL SCIENCES*

by Mary C. Murphy
Women's Bureau

The biological sciences offer a growing number of career opportunities for young women with an interest and ability in science. For many years, women have played an important role in this large occupational field, and future opportunities for well-trained young women are promising.

Biology, the study of the structure and life cycle of living organisms, covers so many diverse areas that biologists are usually classified by their area of specialization. This field of study is divided into three major branches: Zoology, the study of animal life; botany, the study of plants; and microbiology, the study of bacteria, viruses, molds, and other microscopic organisms.

Scientists, both men and women, employed in this field include biology teachers, biologists, zoologists, botanists, microbiologists, and bacteriologists, as well as others who are identified by their particular specialties within the three major fields of biology--such as entomologists, ichthyologists, mycologists, virologists, and geneticists. A large number of technical or subprofessional personnel are also employed in this field, and still other workers perform such "housekeeping activities" as the maintenance of supplies and equipment and the care and feeding of animals used in experiments.

Total employment in the biological sciences has been variously estimated at between 50,000 and 85,000, depending chiefly on the exact occupational coverage of the estimates. The proportion of women has been estimated at from 10 to 20 percent of total employment in the field. This article is concerned primarily with women who have had training in the biological sciences and who are engaged in teaching or research. It does not include those who are utilizing such training in the fields of agricultural science (agronomy, forestry and wildlife management, horticulture, soil conservation, etc.) or medical science (medicine, nursing, therapy, pharmacy, dentistry, etc.).

*Based on a bulletin of the same title soon to be published by the Women's Bureau of the U.S. Department of Labor.

Nature of Work

Work performed by persons in the biological sciences falls into several broad areas of activity, but the vast majority of women in this field are engaged in either teaching or research. Some others use their science backgrounds as medical or biological illustrators, science librarians, technical writers and editors, or biostatisticians.

Teaching. Women biology instructors and professors in colleges and universities teach courses in biology and supervise biology laboratories. They may also conduct independent projects in basic research. University biology professors, however, often spend more of their time conducting independent research projects and working with graduate students than in teaching. High school biology teachers usually teach several classes in biology and one or two other courses, such as general science.

Research. Women scientists and assistants who are engaged in basic research in the biological sciences are seeking to discover new scientific facts or to utilize old facts in a new way. For the most part, basic research in the biological sciences is carried on by the Federal Government, universities, and nonprofit institutions or foundations. Increasingly, however, private concerns are devoting a portion of their

Scientists making new cultures and feeding old ones in their research on allergies and infectious diseases

facilities to such research. Women biological scientists are also engaged in applied research in hospitals (both private and public), public health laboratories, commercial research firms, and manufacturing establishments, such as pharmaceutical houses.

Where Employed

Persons trained in the biological sciences are employed by educational institutions, government agencies, private industry establishments, and nonprofit organizations. Roughly half of all workers in this field are employed in teaching, primarily in colleges and universities. The proportion of women among faculty members who teach biological sciences was over a half in the women's colleges and almost a fifth in all colleges and universities (100) recently studied by the Women's Bureau of the U.S. Department of Labor. The proportion of women among high school biology teachers is believed to be relatively high--perhaps as much as a half.

Government is another large employer of persons trained in the biological sciences. Federal agencies employ about two-thirds of these government workers, of whom an estimated 15 percent are women. Most of the other

government jobs in this field are with State, county, and municipal health departments. Women account for a very large proportion (generally between 40 and 60 percent) of the personnel in State health department laboratories.

The third largest group of biological scientists is employed in private industry. Pharmaceutical firms employ a large number of biologists, and virtually all large food and beverage manufacturers employ these scientists in their laboratories. Most of these manufacturers employ women biologists on their staffs; in some, the proportion of women among their scientific personnel is quite high. However, relatively few women biologists have been promoted to supervisory or managerial positions.

During the past quarter century, a growing number of nonprofit organizations have been established in the medical health field. Many of these groups carry on research activities and employ sizable numbers of biological scientists and supporting workers. Well-trained women scientists and technicians apparently are readily considered for employment in these laboratories. In addition, a few biologists are employed by museums and zoological parks.

A research aid sets up equipment to separate enzymes from tumor tissue—one step in cancer research

Both biological research and teaching are today offering more opportunities for part-time employment to qualified women, particularly housewives, who are not available for full-time work. For example, many laboratory experiments require around-the-clock observations or testing and, therefore, may require supplementary personnel to replace regular staff members when they go off-duty for evenings, weekends, or vacations. To meet their teacher shortages, a number of high schools and colleges also employ qualified housewives for part-time classroom teaching or laboratory supervision. In addition, some colleges and universities that conduct evening courses in biological sciences employ qualified women to teach these classes. In the next decade, the number of employers utilizing part-time personnel can be expected to grow.

Training

Young women who aspire to highest professional recognition and greatest financial reward will have a definite advantage if they have a doctoral or medical degree. Many universities and some colleges require that most of their teaching staff have a Ph. D. or be working toward it, and a doctoral degree is also required for many research jobs.

Nevertheless, women who hold only a bachelor's degree play a very important role in today's biological research team as research associates or research assistants. Under the direction and supervision of scientists who serve as project leaders, research assistants perform the many activities necessary to advance a project toward its goal, following designated, fairly standard laboratory techniques.

The required course of study for a bachelor's degree with a major in biology varies markedly from school to school. In order to gain some insight into current course requirements, the Women's Bureau examined the curriculums of 100 colleges and universities located throughout the United States. Virtually all require a student majoring in biology to take at least one course in general zoology or general botany. About two-thirds require courses in genetics; and about two-thirds, in comparative anatomy. Embryology and physiology are subjects required by a third of the schools; a fourth require a course in bacteriology; and a fourth require a senior seminar. Among other courses that may be required are invertebrate zoology, histology, ecology, taxonomy, entomology, mycology, evolution, and history or philosophy of science.

Financial Assistance. Today, a high school graduate with limited financial resources but an outstanding academic record and strong aspirations for a college education in the biological sciences can obtain financial aid from many sources. Information on the types of scholarships which are available may be obtained from school counselors and librarians. A student in need of financial assistance may also write to the college or university of her choice, asking for information on scholarships available in the field of her interest.

The National Defense Education Act of 1958 provides for the creation of loan funds in American colleges and universities from which a full-time student may borrow up to $5,000. Special consideration is given students with superior academic backgrounds who intend to teach in elementary or secondary schools or who plan to specialize in science, mathematics, engineering, or a modern foreign language.

Women Biology Graduates. Women have recently shown a growing interest in the study of the biological sciences, as evidenced by the number of college degrees earned. Over 4,000 degrees in this field were awarded to women in the academic year 1958-59, compared with only 2,900 in 1955-56. Over this 3-year period, the rate of increase in degrees granted women in the biological sciences (38 percent) was more than double that for all degrees granted women (16 percent).

A survey of women receiving their bachelor's degrees in June 1957 showed the employment status 6 months after graduation of an estimated 2,800 women who had majored in the biological sciences.[1] Of these, 60 percent were employed; 32 percent--quite a high proportion in relationship to that for graduates with majors in other fields--were continuing their schooling; 2 percent were still seeking work; and 6 percent were not employed, in school, or seeking work. Among the employed (about 1,950), nearly half were working as biologists or technicians in biological and health related fields. Another 26 percent were teaching, 5 percent were employed as chemists, and almost the same proportion were nurses. Of these employed graduates, 38 percent reported that they had found their jobs through application to their employers; 26 percent, through their college placement bureau or a college professor; and 21 percent, through the efforts of their families or friends. Others found their jobs through public and private employment agencies or through newspaper or magazine advertisements.

Advancement

The majority of women in the biological sciences who begin their teaching careers at colleges or universities are hired as instructors. Thereafter, their work performance is evaluated periodically, and those who meet established criteria may receive a raise in salary as instructors or be promoted to assistant professors. As vacancies occur and "junior" faculty members achieve proficiency and professional recognition in their teaching or research activities, they usually advance to associate professors and then to professors. A professor who also has administrative abil-

[1] First Jobs of College Women, Report of Women Graduates, Class of 1957. Women's Bureau Bull. 268, 1959.

ities may be promoted to head of a department or dean of a college.

At the high school level, the size of the school system is a major factor determining promotion opportunities for science teachers. In many small schools, advancement may be limited to periodic salary increases based on length of service. The lines of promotion in such schools may be directly from classroom teacher to school principal and, in some instances, to superintendent of schools. In larger schools, a teacher may be promoted to head of the biology department and then to head of the science department, prior to advancing to the administrative positions of principal and superintendent. Usually to attain the latter positions, a teacher must have an advanced degree (often a Ph. D.) and administrative abilities.

In the past, the customary line of promotion for scientists engaged in research in public agencies and private firms was from research to primarily administrative jobs. Today, however, scientists in many laboratories can also be promoted to high-level research jobs where their salaries are comparable to those in top administrative jobs. Since relatively few women scientists have been promoted to high administrative posts, this new "open door" policy to advance via progressively higher research channels is a particularly favorable development for women who can demonstrate technical proficiency.

Earnings

The average salary for all secondary school teachers, according to another NEA survey, was about $5,335 for the 1959-60 academic year. The largest proportions of the teachers who earned a salary of $6,500 or more (11 percent of all secondary teachers) were in California, Alaska, New York, and New Jersey.

Salaries of biological scientists in the Federal Government, along with those of all other Federal white-collar workers, were increased in mid-1960. Most inexperienced persons who have a bachelor's degree in biological science are now hired at an annual salary of $4,345. Those with a master's degree usually start at $5,355; and those with a doctoral degree, at $6,435. Experienced workers earn considerably more. For example, in mid-1958 the average annual salaries received by workers in selected professional occupational series were as follows: $7,229 in bacteriology, $7,436 in zoology, $7,836 in biology, $7,983 in plant physiology, $8,112 in genetics, and $9,360 in pharmacology.

In colleges and universities, according to a National Education Association survey of 1959-60 salaries (based on a 9-month school year), average salaries for women faculty members in all fields of study were $7,900 for professors, $6,800 for associate professors, $5,875 assistant professors, and $4,900 for instructors. Earnings for three-fourths of these women were above $6,700 for professors, $5,900 for associate professors, $5,200 for assistant professors, and $4,400 for instructors. By regions, the median salaries for all women teaching in colleges and universities ranged from $5,100 in the Southeast to $6,815 in the Far West.

Of course, earnings of teachers and research workers in colleges and universities generally differ according to their academic training and experience and whether they are employed by a college or a university. Other factors contributing to salary differences among these workers are geographic region, sex, and type of institution (women's or coeducational, public or private).

Women who have only a high school education or who have not completed college may be employed by the Federal Government in such jobs as medical biology technician, biology aid, or laboratory animal caretaker. The beginning salaries for technicians range from $3,500 to $5,355 a year, depending on the employee's education and experience. Biology aids usually start at salaries between $3,185 to $5,355 a year; and laboratory animal caretakers, from $3,185 to $4,345.

An experienced technologist sorts bacteriological specimens for examination and analysis

In mid-1960, the Women's Bureau obtained information on entrance salaries in a number of representative firms around the country which employ workers in the biological sciences. The most common entrance salary for women employed by these firms in jobs that do not require a college degree was about $3,400 a year. Women in more responsible occupational categories (but still in the subprofessional or technical classifications) had beginning salaries of $3,600 to $3,800. Women with bachelor's degrees and no previous work experience earned from about $4,000 to $6,000 a year. For those with master's degrees, beginning salaries ranged from about $5,400 to $6,800. Women with doctoral degrees started at $6,000 to $8,500, with the most common salary about $7,900 a year. In some private industry establishments, beginning salaries for women were slightly lower than those for men possessing the same qualifications. In jobs requiring a doctoral degree, however, the salary rates in all reporting establishments were uniform for both sexes.

The Biological Sciences of the Future

Atomic Biology. Among the exciting fields that have recently emerged in the

biological sciences is atomic radiation research. Pioneering scientists are studying the effects of radiation upon such biological processes as aging, tumor growth, mutations and other changes in the hereditary mechanism, structural differences in proteins and cells, and sensitivity and tolerance adjustments.

Private companies, universities, and government agencies are already involved in various aspects of radiological research and its application. Among the government agencies concerned with this field are the Departments of Defense and Health, Education, and Welfare; the Veterans Administration; the Atomic Energy Commission; and State and local health departments.

Women represent a fairly sizable proportion--ranging from one-fourth in some installations to three-fifths in others--of all biologists and biological technicians employed by selected Atomic Energy Commission laboratories studied by the Women's Bureau in early 1960. Although the different installations stress different areas of biology, most of the women at these laboratories were employed in medical technology, general biology, physiology, biochemistry, microbiology, cytology and cytochemistry, genetics, pathology, and enzymology.

Space Biology. Launching a manned satellite is an undertaking of herculean proportions that requires the participation of many types of scientists, including biologists. Exobiology, space biology, extraterrestrial biology, and bioastronautics are all merely synonyms for this new and exciting branch of science.

Although microbiologists and biochemists will be in the forefront of exobiology research, virtually all branches of biology will be represented in the long-range space programs. This tremendous area of research ranges from systematics biology, which classifies species found in outer space, to psychology or human engineering, which studies anxiety, loneliness, performance, and other behavioral manifestations.

Relatively few women have had either the training or the opportunity to participate in space biology research. But as activities in this field accelerate, it is expected that more and more qualified women will find jobs available to them, especially those which require highly trained scientists in laboratory work.

GUIDANCE WORKERS CERTIFICATION REQUIREMENTS

This publication, prepared by the U.S. Office of Education, should prove useful to all persons interested in the developing field of guidance--counselors, counselor trainers, teachers preparing for counseling responsibilities, local school guidance directors, school administrators, and State departments of education.

Part I of the bulletin lists guidance workers' certification requirements in the 50 States, the District of Columbia, Guam, Puerto Rico, and the Virgin Islands. Part II lists certification requirements for school psychologists, who are in some instances labeled counseling psychologists or psychometricians.

Guidance Workers' Certification Requirements (Office of Education Bull. 1960, No. 14) is available from the Superintendent of Documents, Washington 25, D.C., at 35 cents per copy.

INCREASE IN UNION WAGE RATES FOR LOCAL TRUCKDRIVERS AND DRIVER-HELPERS

Union wage scales in 52 large cities advanced by an average of 12 cents an hour for local truckdrivers and 10 cents an hour for driver-helpers between July 1, 1958, and July 1, 1959.[1] The average local increases for drivers ranged from 7.5 cents an hour in Oklahoma City to 36.8 cents an hour in Charlotte. For driver-helpers, average hourly increases ranged from 2.2 cents in Atlanta to 20 cents in Salt Lake City.

The new hourly wage scales in the cities surveyed averaged $2.56 for truckdrivers and $2.27 for driver-helpers on July 1, 1959. (See table.) The average local pay scales for drivers ranged from $2.02 in New Orleans to $2.82 in the San Francisco-Oakland metropolitan area. The range for driver-helpers was from $1.20 in Knoxville to $2.58 in San Francisco-Oakland.

Among population-size groups, the cities with a population of over a million had the highest average wage scale for drivers ($2.63); the smallest cities surveyed--those with 100,000 to 250,000 population--had the lowest average wage scale ($2.45). However, the average wage scales in some cities overlapped the limits of the population groupings for both drivers and helpers. For example, the $2.72 average scale for drivers in Peoria, a city in the smallest population group studied, exceeded the average for all other cities, regardless of size, with the single exception of San Francisco-Oakland.

*This article is one in a series presenting current information on fields of work covered in the 1959 edition of the Occupational Outlook Handbook.

[1]Union scales are the minimum wage scales or maximum schedules of hours agreed on through collective bargaining between trade unions and employers. Rates which are higher than the negotiated minimum, and which may be paid for special qualifications or other reasons, are not included. Data reported in this article were compiled by the Bureau of Labor Statistics from its 24th annual survey of union wage scales in local city trucking, which covered about 275,000 drivers and 38,000 helpers in 52 cities with populations of 100,000 and over. The results of this survey are published in: Union Wages and Hours: Motortruck Drivers and Helpers, July 1, 1959, Bureau of Labor Statistics Bulletin 1270. The full report may be purchased from the Superintendent of Documents, U. S. Government Printing Office, at 30 cents per copy.

Average union hourly wage rates for local truckdrivers and helpers in 52 cities, July 1, 1959

City	Average hourly rates		City	Average hourly rates	
	Drivers[1]	Helpers		Drivers[1]	Helpers
52-city average	$2.56	$2.27	Chicago, Ill.	$2.65	$2.39
			Cincinnati, Ohio	2.55	2.39
By population-size group:			Cleveland, Ohio	2.67	2.23
1,000,000 and over (5 cities)	2.63	2.26			
500,000 to 1,000,000 (13 cities)	2.56	2.28	Columbus, Ohio	2.61	1.83
250,000 to 500,000 (15 cities)	2.54	2.32	Dallas, Tex.	2.44	2.43
100,000 to 250,000 (19 cities)	2.45	2.23	Dayton, Ohio	2.59	2.01
Atlanta, Ga.	2.48	1.57	Denver, Colo.	2.30	1.91
Baltimore, Md.	2.32	2.09	Des Moines, Iowa	2.42	2.54
Birmingham, Ala.	2.41	1.23	Detroit, Mich.	2.70	2.39
Boston, Mass.	2.40	2.17	Erie, Pa.	2.46	2.39
Buffalo, N.Y.	2.55	2.29	Grand Rapids, Mich.	2.56	2.23
Charlotte, N.C.	2.45	----	Houston, Tex.	2.31	2.22

See footnotes at end of table.

Average union hourly wage rates for local truckdrivers and helpers in 52 cities, July 1, 1959 (Continued)

City	Average hourly rates		City	Average hourly rates	
	Drivers[1]	Helpers		Drivers[1]	Helpers
Indianapolis, Ind.	$2.56	$2.36	Philadelphia, Pa.	$2.47	$2.27
Jacksonville, Fla.	2.49	----	Pittsburgh, Pa.	2.65	2.54
Kansas City, Mo.	2.46	2.42	Portland, Oreg.	2.54	2.35
Knoxville, Tenn.	2.43	1.20	Providence, R.I.	2.40	2.18
Little Rock, Ark.	2.32	1.93	Richmond, Va.	2.33	----
Los Angeles, Calif.	2.70	2.41	Rochester, N.Y.	2.48	2.35
Louisville, Ky.	2.47	2.28	St. Louis, Mo.	2.59	2.31
Memphis, Tenn.	2.36	1.26	Salt Lake City, Utah	2.11	1.97
Milwaukee, Wis.	2.60	2.45	San Antonio, Tex.	2.49	2.42
Minneapolis-St. Paul, Minn.	2.57	2.47	San Francisco-Oakland, Calif.	2.82	2.58
Newark, N.J.	2.67	2.16	Scranton, Pa.	2.22	2.11
New Haven, Conn.	2.43	2.24	Seattle, Wash.	2.69	2.52
New Orleans, La.	2.02	1.52	Spokane, Wash.	2.58	2.57
New York, N.Y.	2.62	2.16	Springfield, Mass.	2.42	2.16
Oklahoma City, Okla.	2.29	----	Syracuse, N.Y.	2.46	2.40
Omaha, Nebr.	2.45	----	Toledo, Ohio	2.55	2.43
Peoria, Ill.	2.72	2.34	Washington, D.C.	2.10	1.86

[1]For the average rates for local truckdrivers in effect on July 1, 1958, see the 1959 edition of the Occupational Outlook Handbook (p. 424).

[2]Only 14 of the 19 cities in this size group reported minimum wage scales for driver-helpers on July 1, 1959.

Note: Dashes indicate no rate reported.

TEACHER EXCHANGE OPPORTUNITIES, 1961-62

October 15, 1960, is the deadline for applications by teachers for employment overseas under the United States International Educational Exchange Program sponsored by the U.S. Office of Education. About 400 positions will be available to American teachers in 55 countries under this program during the 1961-62 academic year. Positions will be open in American-sponsored elementary and secondary schools and schools of the participating countries.

Applicants must be United States citizens by birth or by naturalization. They must hold a bachelor's degree or its equivalent. At least 3 years of successful full-time teaching, preferably in the subject field and at the level of the position for which application is made, is required. Although facility in reading, writing, and speaking the language of the host country is not required in every instance, it is regarded as a "definite asset."

Detailed information on requirements, exchange arrangements, grants, and transportation is given in the publication, Teacher Exchange Opportunities, 1961-62, prepared by the U.S. Office of Education. Interested teachers may obtain the publication and an application from the Teacher Exchange Section, U.S. Office of Education, Department of Health, Education, and Welfare, Washington 25, D.C.

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*This index will cover issues which supplement the 1959 edition of the Occupational Outlook Handbook. For index on previous issues of the Quarterly, see Vol. 3, No. 3, September 1959.

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